WHAT IS CLAIMED IS:

1. A vehicular motion control apparatus, comprising:

a steering angle detecting section that detects a vehicular steering angle;

a vehicle speed detecting section that detects a vehicle speed;

a vehicular motion control mechanism that is capable of controlling a vehicular motion;

a state detecting section that detects a state of the vehicular motion control mechanism;

a vehicular motion target value calculating section that calculates a target value of the vehicular motion for a response characteristic on a vehicular plane motion to be enabled to provide a predetermined response characteristic on the basis of detection values of the steering angle and the vehicle speed and vehicle speed dependent constants preset in a form of a map for each vehicle speed;

a control command value calculating section that calculates a vehicular motion control mechanism command value required to achieve the target value of the vehicular motion; and

a servo calculating section that provides a control signal for a rear road wheel steering actuator in such a manner that a detection value of the state of the vehicular motion control mechanism is made coincident with the motion control mechanism command value; and

a vehicular velocity variation rate limiter that places a limitation on a vehicle speed variation rate and varies in accordance with the detection

value of the vehicular steering angle, the vehicular motion target value calculating section using an output of the vehicular speed variation rate limiter for a map reference vehicle speed and the control command value calculating section using the output of the vehicular speed variation rate limiter to the detection value of the vehicle speed for a control command value calculation.

2. A vehicular motion control apparatus as claimed in claim 1, wherein the vehicle speed variation rate limiter is designed in such a manner that, as the detection value of the steering angle becomes larger, a limit value of the vehicle speed variation rate is made smaller and, as the detection value of the steering angle becomes smaller, the limit value of the vehicle speed variation rate is made larger.

3. A vehicular motion control apparatus as claimed in claim 1, wherein the vehicular motion control mechanism comprises a rear road wheel steering angle providing section that provides a rear road wheel steering angle for the vehicle, the state detecting section comprises a rear road wheel steering angle detecting section that detects the rear road wheel steering angle, the control command value calculating section comprises a rear road wheel steering angular command value calculating section that calculates a rear road wheel steering angle command value required to achieve the vehicular motion target value, and the rear road wheel steering angle command value calculating section approaches the rear steering angle command value to zero when the detection value

of the vehicle speed is lower than a preset vehicle speed irrespective of a result of calculation of the rear road wheel command value required to achieve the vehicular motion target value.

4. A vehicular motion control apparatus as claimed in claim 3, wherein the vehicular motion value calculating section comprises a vehicular motion target value setting section that calculates a target yaw rate ($\Psi'*$) and a target yaw angular acceleration ($\Psi''*$) on the basis of the detection values of a front road wheel steering angle detecting section and of the vehicle speed detecting section, the rear road wheel steering command value calculating section calculates a target rear road wheel steering angle ($\delta*$) on the basis of the target yaw rate ($\Psi'*$), target yaw angular acceleration ($\Psi''*$), the detection values of the front road wheel steering angle (θ) and the vehicle speed (V), and the servo calculating section comprises a rear road wheel steering angle servo calculating section that outputs the control signal to the rear road wheel steering actuator in such a manner that the rear road wheel steering angle (δ) detected by the rear road wheel steering angle detecting section is made coincident with the target value of the rear road wheel steering angle ($\delta*$).

5. A vehicular motion control apparatus as claimed in claim 4, wherein the vehicular motion target value setting section calculates the target yaw rate ($\Psi'*$) to the front road wheel steering angle (θ) on the basis of a predetermined transfer function ($\Psi'*/\theta$)

between the front road wheel steering angle (θ) and the target yaw rate ($\Psi'*$), the predetermined transfer function having a plurality of vehicle speed dependent constants which are preset to enable their predetermined characteristics in accordance with the vehicle speed which is the map reference vehicle speed (Vmap) and the vehicle speed for the control command calculation.

6. A vehicular motion control apparatus as claimed in claim 5, wherein the rear road wheel steering angle command value calculating section calculates the target rear road wheel steering angle ($\delta*$) which enables an actual yaw rate to be coincident with the target yaw rate ($\Psi'*$) on the basis of the target yaw rate ($\Psi'*$), the target yaw angular acceleration ($\Psi''*$), the detection value of the front road wheel steering angle (θ), and the detection value of the vehicle speed which is the map reference vehicle speed (Vmap) through the vehicle speed variation rate limiter.

7. A vehicular motion control apparatus as claimed in claim 6, wherein the vehicle speed variation rate limiter comprises: a vehicle speed variation rate limit value setting section that sets a vehicle speed variation rate limit value (dVlimit) in accordance with an absolute value of the steering angle ($|\theta|$) detected by the front road wheel steering angle detecting section; a first map reference vehicle speed comparing section that compares the present detection value (V) of the vehicle speed with a

previous map reference vehicle speed (Vmap(n-1)) before a predetermined control period to determine whether the present detection value of the vehicle speed (V(n)) is equal to, larger than, or smaller than the previous map reference vehicle speed (Vmap(n-1)); a second map reference value comparing section that compares a first difference of the present value of the vehicle speed (V(n)) from the previous map reference vehicle speed (V(n) -Vmap(n-1)) is larger than the vehicle speed variation limit value (dVlimit) when the first map reference vehicle speed comparing section determines that the present detection value of the vehicle speed (V(n)) is higher than the previous map reference value (Vmap(n-1)); a third map reference vehicle speed comparing section that compares a second difference of the previous map reference value (Vmap(n-1)) from the present detection value of the vehicle speed (Vmap(n-1)-V(n)) with the vehicle speed variation rate limit value (dVlimit) to determine whether a difference (V(n) - Vmap(n-1))of the present detection value of the vehicle speed (V(n)) from the previous map reference vehicle speed (Vmap(n-1)) is larger than the vehicle speed variation rate limit value (dVlimit) when the first map reference vehicle speed comparing section determines that the present value of the vehicle speed (V(n)) is smaller than the previous value of the map reference vehicle speed (Vmap(n-1)); a first map reference vehicle speed setting section that sets the present map reference vehicle speed (Vmap(n)) in such a manner that the present map reference vehicle speed is set to be equal to an addition of the previous detection value of the map reference vehicle

reference vehicle speed to the vehicle speed variation rate limit value (dVlimit) (Vmap(n) = Vmap(n-1) + dVlimit) when the second map reference vehicle speed comparing section determines that the difference of the present value of the detection value of the vehicle speed (V(n)) from the previous map reference vehicle speed (Vmap(n-1)) is larger than the vehicle speed variation rate limit value (dVlimit); a second map reference vehicle speed setting section that sets the present value of the map reference vehicle speed (Vmap(n)) is set to be equal to the present detection value of the vehicle speed (V(n)) when the first map reference vehicle speed comparing section determines that the present value of the detection value of the vehicle speed V(n) is equal to the previous map reference vehicle speed (Vmap(n-1)), when the second map reference vehicle speed comparing section determines that the first difference ((V(n) - Vmap(n-1)) is equal to or smaller than the vehicle speed variation rate limitation value (dVlimit), and when the third map reference vehicle speed comparing section determines that the second difference is equal to or smaller than the vehicle speed variation rate limit value (dVlimit); and a third map reference vehicle speed setting section that sets the present value of the map reference vehicle speed (Vmap(n)) is equal to a subtraction of the previous value of the map reference vehicle speed (Vmap(n-1)) from the vehicle speed variation rate limit value (dVlimit) when the third map reference vehicle speed comparing section determines that the first difference (V(n) - Vmap(n-

1)) is larger than the vehicle speed variation rate limit value (dVlimit).

8. A vehicular motion control apparatus as claimed in claim 7, wherein the vehicle speed dependent constants ($G\Psi'$, ωn, ζ, n_1) are determined in accordance with the present value of the map reference vehicle speed (Vmap(n)) set by any one of the first, second, and third map reference setting sections.

9. A vehicular motion control apparatus as claimed in claim 6, wherein the rear road wheel steering angle command value calculating section comprises: a vehicle speed region determining section that determines whether the detection value of the vehicle speed is lower than a predetermined vehicle speed (B); a first rear road wheel steering angle command value comparing section that compares an absolute value of a previous value of the rear road wheel steering angle command value ($|\delta*(n-1)|$) before a predetermined control period with a rear road wheel steering angle command value convergence quantity (α) to determine whether the absolute value of the previous value of the rear road wheel steering angle command value ($|\delta*(n-1)|$) is larger than the rear road wheel steering angle command value convergence quantity (α) when the detection value of the vehicle speed (V) is lower than the predetermined vehicle speed (B); a first rear road wheel steering angle command value setting section that sets the present value of the rear road wheel steering angle command value $\delta*(n)$ to zero when the absolute value of the

previous value of the rear road wheel steering angle command value ($|\delta^*(n-1)|$) is equal to or lower than the rear road wheel steering angle command value convergence quantity (α) ($|\delta^*(n-1)| \leq \alpha$); a second rear road wheel steering angle command value comparing section that compares the previous value of the rear road wheel steering angle command value ($\delta^*(n-1)$) with zero when the absolute value of the previous value of the rear road wheel steering angle command value ($|\delta^*(n-1)|$) is larger than the rear road wheel steering angle command value convergence quantity (α) ($|\delta^*(n-1)| > \alpha$); a first rear road wheel steering angle command value setting section that sets the present value of the rear road wheel steering angle command value $\delta^*(n)$ to zero when the absolute value of the previous value of the rear road wheel steering angle command value ($|\delta^*(n-1)|$) is equal to or smaller than the rear road wheel steering angle command value convergence quantity (α); a second rear road wheel steering angle command value setting section that sets the present value of the rear road wheel steering angle command value $\delta^*(n)$ as follows: $\delta^*(n) = \delta^*(n-1) - \alpha$, when the previous value of the rear road wheel steering angle command value $\delta^*(n-1)$ is larger than zero; and a third rear road wheel steering angle command value setting section that sets the present value of the rear road wheel steering angle command value $\delta^*(n)$ as follows: $\delta^*(n) = \delta^*(n-1) + \alpha$, when the previous value of the rear road wheel steering angle command value $\delta^*(n-1)$ is equal to or smaller than zero.

10. A vehicular motion control apparatus as claimed in claim 9, wherein the rear road wheel steering command value convergence quantity (α) is a set value of a speed at which the absolute value of the rear road wheel steering angle command value $|\delta^*(n)|$ is approached to zero.

11. A vehicular motion control apparatus, comprising:

steering angle detecting means for detecting a vehicular steering angle;

vehicle speed detecting means for detecting a vehicle speed;

vehicular motion controlling means which is capable of controlling a vehicular motion;

state detecting means for detecting a state of the vehicular motion controlling means;

vehicular target value calculating means for calculating a target value of the vehicular motion for a response characteristic on a vehicular plane motion to be enabled to provide a predetermined response characteristic on the basis of detection values of the steering angle and the vehicle speed and vehicle speed dependent constants preset in a form of a map for each vehicle speed;

control command value calculating means for calculating a vehicular motion controlling means command value required to achieve the target value of the vehicular motion; and

servo calculating means for providing a control signal for a rear road wheel steering actuator in such a manner that a detection value of the state of the vehicular motion controlling means is made

coincident with the motion control mechanism command value; and

vehicular velocity variation rate limiting means for placing a limitation on a vehicle speed variation rate and varies in accordance with the detection value of the vehicular steering angle, the vehicular motion target value calculating means using an output of the vehicular speed variation rate limiting means for a map reference vehicle speed and the control command value calculating means using the output of the vehicular speed variation rate limiting means to the detection value of the vehicle speed for a control command value calculation.

12. A vehicular motion control method, comprising:

detecting a vehicular steering angle;

detecting a vehicle speed;

providing a vehicular motion control mechanism which is capable of controlling a vehicular motion;

detecting a state of the vehicular motion control mechanism;

calculating a target value of the vehicular motion for a response characteristic on a vehicular plane motion to be enabled to provide a predetermined response characteristic on the basis of detection values of the steering angle and the vehicle speed and vehicle speed dependent constants preset in a form of a map for each vehicle speed;

calculating a vehicular motion control mechanism command value required to achieve the target value of the vehicular motion; and

providing a control signal for a rear road wheel steering actuator in such a manner that a

detection value of the state of the vehicular motion control mechanism is made coincident with the motion control mechanism command value; and

providing a vehicle speed variation rate limiter to place a vehicle speed variation rate limitation on the detection value of the vehicle speed and varying the vehicle speed variation rate limitation in accordance with the detection value of the vehicular steering angle, at the vehicular motion target value calculation, using an output of the vehicular speed variation rate limiter for a map reference vehicle speed and, at the control command value calculation, using the output of the vehicular speed variation rate limiter to the detection value of the vehicle speed for a control command value calculation.